Volunteer Lake Assessment Program Individual Lake Reports
DEERING RESERVOIR, DEERING, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	2,816	Max. Depth (m):	11.3	Flushing Rate (yr¹)	1.3	
Surface Area (Ac.):	315	Mean Depth (m):	3.5	P Retention Coef:	0.67	
Shore Length (m):	8,850	Volume (m³):	4,442,500	Elevation (ft):	921	

TROPHIC CLASSIFICATION

Year	Trophic class
1980	MESOTROPHIC
1997	OLIGOTROPHIC

KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the 2012 305(b) report on the status of N.H. waters, and are based on data collected from 2001-2011.

Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	>/=5 samples and median is < threshold but > 1/2 threshold value.
	pH	Bad	>10%, with a minimum of 2, samples exceed criteria, with 1 or more by a large margin.
	D.O. (mg/L)	Encouraging	< 10 samples and no exceedance of criteria. More data needed.
	D.O. (% sat)	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Chlorophyll-a	Good	>/=5 samples and median is < threshold but > 1/2 threshold value.
Primary Contact Recreation	E. coli	Very Good	All bacteria samples <75% of geometric mean criteria, but not enough to calculate geometric mean. Or, all bacteria samples are < single sample criteria and calculated Geometric means are less than geometric mean criteria.
	Chlorophyll-a	Very Good	At least 10 samples with 0 exceedances of criteria.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

DEERING RESERVOIR - HOPKINTON INDEPENDENT SCHOOL BEACH	E. coli	Very Good	All bacteria samples <75% of geometric mean criteria, but not enough to calculate geometric mean. Or, all bacteria samples are < single sample criteria and calculated Geometric means are less than geometric mean criteria.
DEERING RESERVOIR - DEERING LAKE BEACH	E. coli	Bad	>/=1 exceedance(s) of geometric mean criterion and/or >/=2 exceedances of single sample criterion, with 1 or more >2X criteria.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.
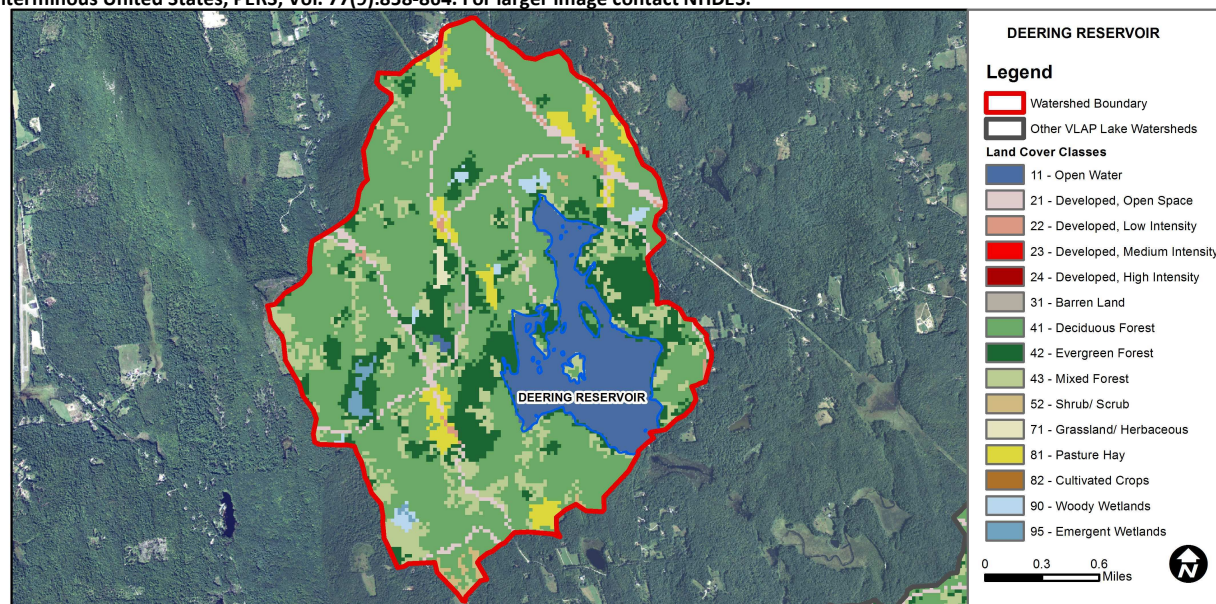
Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	11.9	Barren Land	0.06	Grassland/Herbaceous	0.25
Developed-Open Space	4.22	Deciduous Forest	54.05	Pasture Hay	3.36
Developed-Low Intensity	0.71	Evergreen Forest	13.72	Cultivated Crops	0
Developed-Medium Intensity	0.03	Mixed Forest	9.69	Woody Wetlands	0.87
Developed-High Intensity	0	Shrub-Scrub	0.55	Emergent Wetlands	0.52

OBSERVATIONS AND RECOMMENDATIONS (*Refer to Table 1 and Historical Deep Spot Data Graphics*)

- **CHLOROPHYLL-A:** Chlorophyll levels were low in June and July and spiked to elevated levels in August. The 2013 average was approximately equal to the state median and increased from 2012. Historical trend analysis indicates highly variable chlorophyll between years.

- **CONDUCTIVITY/CHLORIDE:** Deep spot, Outlet and Zowski Inlet conductivity and chloride levels were slightly greater than the state medians. Main Inlet conductivity was relatively low in June during high flows, and elevated in July and August when flows were low to moderate and the water was more turbid suggesting potential influences from mineral rich substrate and groundwater when flow conditions are low and minerals are more concentrated. Morotta Inlet conductivity and chloride was elevated in June during high flow, and increased substantially in August during low flows. Winter maintenance activities, road salting, along Rt. 149 likely influence conductivity and chloride levels.

- **TOTAL PHOSPHORUS:** Epilimnetic phosphorus was slightly above average in June potentially due to the above average rainfall in late spring/early summer. Average epilimentic phosphorus remained low and historical trend analysis indicates stable epilimnetic phosphorus with low variability between years. Metalimnetic and hypolimnetic phosphorus were low throughout the summer. Main Inlet phosphorus was elevated in July during low flow and the turbidity was also elevated. Morotta Inlet and Zowski Inlet phosphorus was slightly elevated in August during low flow conditions.

- **TRANSPARENCY:** Transparency was lower in June potentially due to stormwater runoff from significant late spring/early summer storm events. Transparency improved in July and August and average transparency was better than the state median. Historical trend analysis indicates stable transparency with low variability between years.

- **TURBIDITY:** Epilimnetic turbidity was higher in June potentially due to stormwater runoff from significant late spring/early summer storm events. Main Inlet turbidity was elevated in July and August potentially due to low flow conditions and wetland influences.

- **PH:** Epilimnetic and metalimnetic pH levels were sufficient to support aquatic life, however levels decreased to critical range in the hypolimnion. Historical trend analysis indicates significantly decreasing (worsening) epilimnetic pH since monitoring began.

- **RECOMMENDED ACTIONS:** The elevated chloride and conductivity in Morotta Inlet suggest road salting impacts. If possible, implement low salt zones along Rt. 149, and/or encourage local officials to obtain a NH Voluntary Salt Applicator Certification through UNH Technology Transfer Center's Green SnowPro Program. The increased frequency and intensity of storm events highlights the importance of managing stormwater runoff, particularly from lake front properties and dirt roads. Encourage lake residents to implement stormwater management projects on their properties utilizing DES' "Homeowner's Guide to Stormwater Management".

Station Name	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	Total P ug/l	Trans. NVS m	Trans. VS m	Turb. ntu	pH
Epilimnion	6.60	4.89	9	57.6	6	5.58	6.00	0.64	6.81
Metalimnion				58.1	8			0.82	6.77
Hypolimnion				60.0	11			1.16	6.19
Main Inlet			15	135.8	18			3.65	6.54
Morotta Inlet			59	255.6	15			0.99	6.78
Outlet			9	57.4	6			0.58	6.96
Zowski Inlet			13	85.5	13			0.94	7.02

Table 1. 2013 Average Water Quality Data for DEERING RESERVOIR

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m³
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: < 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: 6.5-8.0 (unless naturally occurring)

HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
pH	Degrading	Data significantly decreasing.	Chlorophyll-a	Stable	Trend not significant; data highly variable.
Conductivity	Stable	Trend not significant; data moderately variable.	Transparency	Stable	Trend not significant; data show low variability.
			Phosphorus (epilimnion)	Stable	Trend not significant; data show low variability.

Historical Trend Epilimnetic Conductivity and pH

Historical Deep Spot Chlorophyll-a, Epilimnetic Total Phosphorus & Transparency Data